By way of illustration we extract the following sentence, descriptive of the work of the roots and leaves:

"The cells of the roots, like hewers and miners, sink numerous shafts in the spaces assigned to them, drive their galleries toward all points of the compass, in order to break up the mineral treasures, separate them from the incasing stone, and set the machinery of service into motion; day and night with inexhaustible diligence, they extract atom by atom of potash and ammonia, phosphoric and nitric acid, and, without working up their ore, deliver it over to the conducting vessels which transmit it by their powerful system of sucking and forcing pumps to the stem and the leaves. The leaves are cell-villages which perform their daily tasks in the air and the light. Their principle business is to obtain coal, which is the chief constituent of the vegetable body. Our atmosphere is an enormous coal-mine, many miles in thickness, that can not be exhausted in thousands of thousands of years. The coal, indeed, is not found pure in the air, any more than the metal in the ore, but is in combination with oxygen as a transparent gas, carbonic acid, and a peculiar art is required to separate it.

In the mining districts, smelting-houses are erected beside the pits, where the noble metal is extracted from the impure ores. The green cells of the leaves combine the art of the miner with that of the smelter, and have the power of extracting the pure carbon from the atmosphere. In order to perform this work, they must be shone upon by the sun, for the sunlight alone can excite in them the marvelous faculty. Having extracted the carbon, they combine it with water and with the mineral substances that have been drawn from the soil, and prepare from them the living matters out of which the plant itself builds up its cells, and which, taken up into the body of an animal, is transformed by it into flesh and blood."

Such illustrations lighten up the dry technicalities so often used in teaching and lie at the very basis of the great power possessed by some of our lecturers on botany.

Epidendrum cochleatum, L.—Some two years ago I mentioned having discovered in Southern Florida a curious and, to me, new *Orchid*. The plant came into flower during the summer following my discovery. I at once sent it to Prof. Watson for determination. I thought it might be new to science. In due time Prof. Watson reported it to be as above and sent me a full description. He remarked, however, that I was the first one to notice its occurrence in the United States, though the species is common in Central America and the West Indies. Mr. Curtiss also had never seen the species during his very extensive explorations in Florida. The plant in question I found at Jupiter Inlet on the Atlantic coast. It was clinging to the upper limbs of a large live oak and was the only specimen I have seen. Further investigation will undoubtedly reveal more.—W. W. CALKINS, *Chicago, Ill.*

Forest Fires.—Prof. C. S. Sargent this month presented a paper to the Massachusetts State Board of Agriculture on the subject of Forest Fires. Prof. Sargent's facts and opinions are especially valuable as no one has had more extensive means of observation upon all that pertains to forests. In this paper it is stated that the extent of the loss to the country every year from forest fires is something which would astonish the best informed. Not only is the timber destroyed but the fertility of the soil itself, so that it is incapacitated from producing valuable trees again. The following very interesting extract from a report in the *N. Y. Tribune* gives a good idea of the results of a forest fire:

If a forest is destroyed by a fire, which kills the trees and undergrowth of shrubs and herbs, the same species, except in the case of some our least valuable trees, rarely spring up again. Let us take the case of a white pine forest, because the white pine is probably the most valuable forest tree in New England. If a forest of white pine is destroyed by fire this tree does not spring up again, as it would under proper care, and the land is not covered again with any growth of trees for a considerable period. The fire-weed first makes its appearance. The light seed of this plant is often blown for a long distance, and falling upon the bare ground germinates quickly and finially covers the burned surface with vegetation. Birds drop the seeds of raspberries and blackberries, which find sufficient nourishment and light for germination. These, as they grow, cover the ground and afford protection to the stones of the little Moreton cherry, dropped by birds also, or to the light seeds of the gray birch, or some of the willows or poplars, which are constantly blowing about and will germinate anywhere upon any unshaded ground. These are generally the first trees which succeed a fire-swept pine wood. But years elapse before the ground is recovered, even with such trees. The cherries, and the birch and poplars are short-lived and are succeeded by more valuable broad-leaved trees. Squirrels and other animals deposit acorns in the ground, and the wind brings the seeds of maples, ashes and the valuable birches. Such seeds find protection among the poplars and willows which had sprung up, and as these die, the more valuable trees get a chance to grow and gradually occupy the ground. This new forest of hardwood trees, if protected from the fire, will long occupy the ground; and the orignal pine will not appear again until the land, long enriched by an annual deposit of leaves, has been once more stripped of its tree covering and mellowed by years of cultivation.

Such land nearly all over New-England is freed from the plough or the scythe, and, guarded from the fire and pasturage, grows up again with pine. The different processes, however, by which white pine land has been again brought into the condition to produce spontaneously another crop of pine, have occupied a long period of time—so long, indeed, that it must extend through gen-

erations of human life. The forest fire, then, which destroyed the pine, destroyed as well the capacity of the land to produce a similar crop for a period of from 50 to 100 years. The damage inflicted upon the land is, of course, not irreparable in a climate like that of New-England, where the annual rainfall is sufficient always to insure a growth of trees of some sort upon undisturbed ground,and sooner or later in the ordinary workings of Nature's laws forests will succeed each other here; but in some parts of the country where the rain fall is so slight that there is a constant and severe struggle between the forest and the plain and where trees under the most favorable conditions barely exist, a fire not only kills the forest but it makes any future growth of trees impossible. We in New-England are more fortunate; and it is entirely within our power to regulate the composition of our forests and maintain a proper proportion between forest areas and farming land.

The Orgin of our Vernal Flora.—The following remarks on this interesting subject have just appeared in "Nature," by Dr. J. E. Taylor. It is usual to assign an Arctic origin to our mountain flora, and the floral comparisons and statistics fully bear out this brilliant generalization. It is formulated that height above the sea-level is climatally equivalent to northern latitude. This is an assumption that flowering plants are largely conditioned by heat. Thus latitude and oreographical habitats are more or less equal.

Might I introduce another element into this question? Seeing that temperature is so largely influential in explaining the distribution of flowering plants, it occurs to me that not only may height above the sea-level answer to northern distribution, but seasonal occurrence as well.

All botanists must have been struck by the fact that the earliest plants to bloom among our vernal flora are genera peculiarly Alpine. In some instances (as with *Chrysosplenium oppositifolium* and *C. alternifolium*) the species are identical. These latter plants blossom with us in March or April; within the Arctic circle not until June or July, and even so late as August. Thus, with them, seasonal blossoming is equivalent to northern latitude, as regards the thermal conditions under which they flower. The generic names of all our early flowering plants are those pre-eminently Alpine and Arctic in their distribution—Potentilla, Stellaria, Saxifraga, Chrysosplenium, Draba, Ranunculus, Cardamine, Alsine, &c. I contend, therefore, that our vernal flora is explained by the fact that their seasonal occurrence, as regards temperature, is equivalent both to height above sea-level and northern latitude. In every instance it will be found that the blossoming of the species of the above genera necessarily takes place, in Great Britain, two or three months earlier than within the polar circle. May we not therefore contend that we owe our English vernal flora to the same causes as distributed our English Alpine plants; and that they are

as much protected by being able to flower earlier in the year, as if they had been located on the top of high hills or mountains?

The power to endure cold and wet displayed by many members of our vernal flora is very remarkable. Thus *Ranunculus bulbosus* and *R. acris*, *Stellaria media*, &c., are frequntly found in flower all through the winter, unless the season be extra cold. Many other early bloomers among our common flowers are remarkable for their durability, whilst the late flowering plants are generally noticeable for the short space during which they bloom. This indicates a hardihood on the part of our vernal flora which cannot be explained except by reference to the climatal experience of the species. Some of them, as the groundsel and chickweed, may have exchanged an entomophilous for an anemophilous habit, or have become self-fertilised by the change.

Again, it must have been observed that many of our early flowering plants display a tendency towards a seasonable division of labour. All of them either flower before they leaf, or show a tendency to do so,as with coltsfoot (*Tussilago farfara*),the crocus (*C. vernus*),the snow-drop (*Galanthus nivalis*),&c. Even the violets (*Viola odorata* and *V. canina*), the daffodil, primrose, cowslip, &c., although they in part leaf when they flower, develop leaves much more abundantly after flowering than before, thus showing an inclination towards dividing the period of active live into two distinct stages—the productive and vegtative. Every one knows how completely this has been effected by the meadow saffron (*Colchicum autumnale*). My impression is that this early flowering tendency is a survival of the habit these plants had to blossom under more rigorous climatal conditions; in short, that our vernal flora must have the same origin assigned to it as an Alpine; that it has survived through being able to bloom at an early period of the year at low levels, instead of flowering at a later season higher up, above the sea-level; protection and advantage being secured in both instances.—*Science Gossip.*

Fall-blooming of Menyanthes trifoliata.—One who has herborized for twenty years or so, is never astonished at the freaks of autumnal blooming that flowers take. Every one has seen from time to time stray specimens of *Hepatica* or of the various species of *Viola*, while almost every year *Brunella*, *Achillea*, and the common dandelion, may linger into November. Usually such second efforts lack vigor, and often there are disturbances of the inflorescence. This October has been truly remarkable for the number and variety of such waifs, but if they were only the common loiterers I should not feel it worth while to note them. But to-day I saw a sight which was to me phenomenal—a swamp full of *Menyanthes trifoliata* in full bloom on the 23d of October! I donned my rubber boots and waded into the water, as I have often done in May, gathering